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# SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE



FEBRUARY 1, 1936

Never Sees His Shadow

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SCIENCE SERVICE PUBLICATION

## SCIENCE NEWS LETTER

VOL. XXIX



No. 773

The Weekly Summary of

## Current Science

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## SCIENCE SERVICE

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## DO YOU KNOW?

A flute made of iridium-platinum has been tested and is said to have exceptional purity of tone.

The San Francisco-Oakland Bay bridge is being built at a cost greater than the cost of Boulder Dam.

Chicago's Field Museum has received from Ethiopia a collection of 282 prehistoric tools and weapons, made of flint, quartzite, and obsidian.

Paper is being used instead of wax in making leaves and flowers for museum exhibits, since the paper is cheaper, and just as durable and satisfactory.

Essential raw materials which the United States would lack if blockaded in war include antimony, chromium, manganese, mercury, mica, nickel, rubber, tin, tungsten, and wool.

A French club organized to study caves has explored 600 caves since 1930.

The famous Roman physician Galen, second century A. D., advised moving tuberculosis patients to regions of good climate.

Germany reports a use for the sea ooze or slime that occurs in enormous quantities in shallow seas: it has rust-proofing value in paint mixtures.

Certain plant diseases are found to increase and decrease in cycles during periods of years, a discovery which will aid in the farmer's fight against them.

Cleaning 15,000 fossil bones, some representing animals that lived 300 million years ago, is being undertaken at the American Museum of Natural History.

## WITH THE SCIENCES THIS WEEK

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DENTISTRY

# Thymol, Alcohol, Ether Used In New Dental Pain-Killer

**Ingredients Obtainable at Any Good Drug Store Make  
Mixture That Has Banished Dread of Dentist's Chair**

**D**ENTISTS all over the country are visiting their druggists. They are buying three things: thymol, ethyl alcohol, and sulphuric ether. These are the ingredients of the new Hartman formula that takes the pain out of tooth drilling.

Announced by Prof. Leroy L. Hartman, professor of dentistry in the Columbia University School of Dental and Oral Surgery, the new pain-killer is applied to the dentin of a tooth, lying just below the enamel, and makes possible drilling of a cavity without feeling on the part of the patient.

Here is the formula which Prof. Hartman disclosed before 3,000 of his fellow dentists at a joint meeting of the First and Second District Dental Societies of the State of New York:

Formula by weight

Thymol .....	1 1/4 parts
Ethyl alcohol .....	1 part
Sulphuric ether .....	2 parts

The solution is kept in a brown bottle and applied directly to the dentin with a moistened pellet of cotton. The pain-killing effects lasts one hour if the cavity is kept dry by the use of a rubber dental dam. If saliva dilutes the solution the effect may last only twenty minutes. But because the local anesthetic is designed to kill pain only during drilling, the time is ample. A seventy-five cent bottle of the Hartman formula is sufficient for 200 applications.

## Not Good for Self-Treatment

Sufferers from toothache are doomed to disappointment if they rush to the nearest drug store, have the solution prepared and apply it directly to an aching tooth. It must be placed in contact with the dentin inside the tooth and not on the outer enamel for its pain-killing effect. The discoverer of the formula and officers of the dental society warned:

"In the interest of public welfare we warn the public against attempting to use this preparation for the self-treatment of toothache. It is effective when used by a dentist under the proper conditions."

The only possible condition where the solution might aid a home sufferer temporarily would appear to be in the case of a large cavity in a tooth where the dentin is exposed and the outer enamel broken away. With a sure means of preventing pain during drilling, however, many persons who dread the dentist's chair should feel more like visiting their dentist regularly.

A drug manufacturer has already begun the preparation of the tooth desensitizer for distribution to dentists of the nation.

Out of 500 volunteer cases which Prof. Hartman has treated, the only failures occurred when the solution came in contact with phenol, or carbolic acid, which is commonly used in dentistry to sterilize cavities. The phenol must be removed from the cavity, or else several applications of the Hartman solution must be applied to dissolve the phenol.

A doctor turned patient had "his greatest thrill in a dental chair" when a cavity in one of his very sensitive teeth was drilled and filled painlessly with the aid of the new "desensitizer" developed by Dr. Hartman.

Dr. Hartman related the incident in a report of his desensitizer at the meeting of the First and Second District Dental Societies of the State of New York. The name and chemical composition of the desensitizer were made public for the first time at this meeting.

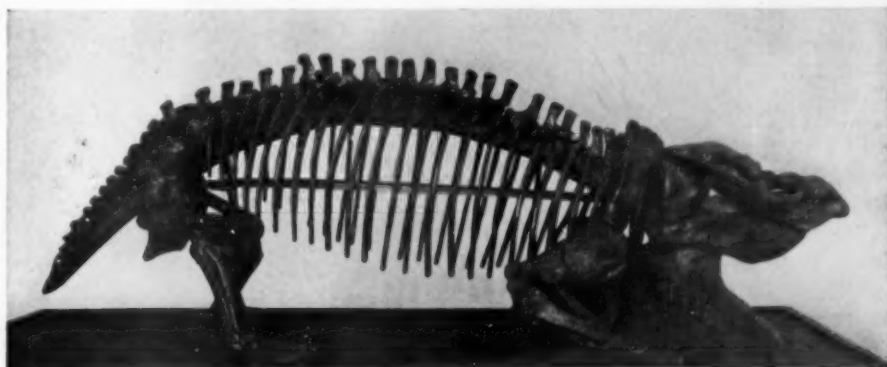
Unlike other anesthetics, which must be injected into the nerves or pulp of the teeth, Dr. Hartman's pain-killer is applied on a bit of cotton directly to the dentin, the area beneath the enamel of the tooth. Dentists have previously held that there are no nerves in the dentin. Dr. Hartman believes this idea is contradicted by the experience of patients who "say that the only part they dread in a dental operation is when you suddenly strike the nerve with the drill."

## A Dentist as Guinea-Pig

This painful experience will soon be a thing of the past, it seems, as a result of Dr. Hartman's discovery. Less than two minutes after the desensitizer has been applied, the drilling may be started without pain or discomfort. The pain-killing effect lasts from twenty minutes to an hour, giving plenty of time to prepare almost any cavity for filling. There are no unpleasant after-effects and the pulp of the tooth remains normal.

Dr. Hartman reported to the dental society a number of cases of patients who had always been especially sensitive to the dentist's drill. Among them was Dr. T., who made a special trip to New York to find out for himself about the new solution.

"He claimed to be the world's worst patient," stated Dr. Hartman, "and ask-



## OLDER THAN THE DINOSAURS

Two hundred million years ago, in the Late Permian age, there was living flesh on these bones: a thick-bodied, sluggish, plant-eating reptile about seven feet long. It had horny jaws, toothless except for a pair of tusks in the male. Probably an easy victim to the reptiles-of-prey that roamed the South Africa of that time, this beast has left few and very fragmentary remains. This practically complete skeleton, brought to the University of Chicago by Dr. A. S. Romer, is the first of its kind to be mounted in any museum. The creature, known to scientists as *Dicynodon tigriceps*, is given a full description in the *Journal of Geology* by Everett Clare Olson.



ed if I would just open a cavity for him so he could have a personal experience. I followed his directions, used a stone to cut through the enamel and exposed the dentin. Then, used a 34 inverted cone bur and made one cut into the dentin. He squirmed from the pain.

He then asked me to make the application. I used the same bur, prepared a cavity and filled it with cement. He got out of the chair, threw his arms around me and hugged me. It had been his greatest thrill in a dental chair."

*Science News Letter, February 1, 1936*

#### VITAL STATISTICS

## Supreme Court Justices Are Not Unusually Long-Lived

**D**ESPITE the general impression that Justices of the U. S. Supreme Court are an unusually long-lived body of men, statistical analysis shows that this is not the case.

As a group, each of the 66 Justices appointed since the court has been in existence lived about a year longer than would be expected for men of their ages in the ordinary walks of life, statisticians of the Metropolitan Life Insurance Company have figured.

Since 1862 the average age of the Justices at appointment has been considerably older than before that date, the figures also show. The situation has been reversed in so far as Presidents are concerned, it is pointed out.

The older average age at appointment of the Supreme Court Justices may be due to the fact that the rapidly growing complexity of our legal structure demands men of riper age. Whatever the reason, the average older age of these appointees during the period since 1862 "seems not to have affected their ability to carry on, if we may be guided by their longevity as compared with that of judges appointed in prior years. The average age of these later justices was almost four and one-half years greater than that of the earlier group—73.7 years as against 69.3," the life insurance company statisticians state in their report.

"During the 146 years that the United States Supreme Court has been in existence, 76 appointments and two reappointments—John Rutledge and Charles E. Hughes—have been made to this distinguished body. Of these 76 men, 66 are dead, their average age at death being 71.4 years. This cannot be called a particularly advanced age despite the fact that there have been three nonagenarians and nine octogenarians on the Supreme Court Bench since its foundation. As nearly as can be computed, the aggregate years of life expectation

of these 66 men at the time of their appointment was 1,205, while the total number of years actually lived was 1,265. As a group, each lived about one year over the life expectancy of men of their ages in ordinary walks of life.

"Prior to the Civil War the picture was somewhat different from that following it. The total years of life expectation of the justices appointed during the earlier period numbered 712, while their actual years of life totalled 713. They thus fulfilled almost exactly the term of life that ordinary men of their age might expect. Subsequent to the Civil War, the number of years lived by the judges somewhat exceeded the expectation of life at time of appointment (552 years as against 493), namely, by not quite two years each over the expected. It can hardly be said, therefore, that life on the Supreme Court Bench is outstandingly conducive to longevity, as is generally supposed."

*Science News Letter, February 1, 1936*

#### PSYCHOLOGY

## Emotional Appeal to Voters Garnered Most Ballots

**P**OLITICAL psychology is an ancient art, but as a science it is just in the process of being born, Prof. George W. Hartmann, psychologist of Pennsylvania State College, told the New York Academy of Science recently.

In a recent test, Prof. Hartmann said, a minority party in a Pennsylvania city checked the vote-pulling power of a pamphlet written with a rational appeal in the form of a series of suggestions for social and economic change, as compared with an emotional appeal pamphlet in the form of a sentimental letter involving primarily an appeal to parental interest.

Distribution was made in three ways: in certain wards of the city, 5,000 copies of the rational pamphlet were personally handed to the voters; in other wards, 5,000 copies of the emotional appeal were similarly given out; and finally other wards were left alone as control districts.

When the votes were checked, in a comparison with the previous year's voting the greatest increase was found in the wards receiving the emotional appeal; next came the rational appeal, and finally the control wards. The emotional pamphlet was twice as effective as the rational questionnaire type of literature.

Two weeks after the election a follow-up check of the voters showed that three times as many people remembered the emotional leaflet as recalled the nature of the rational one.

*Science News Letter, February 1, 1936*



THE CARACOL, AN OVERGROWN RUIN, FROM AN OLD PRINT



THE CARACOL AS IT STANDS RESTORED TODAY—STILL A RIDDLE

ARCHAEOLOGY

## Mayas' Round Tower Restored, But Its Riddle Still Unsolved

THE MOST extraordinary of all the beautiful buildings in the Mayan ruins in tropical Yucatan stands restored—but it is an unsolved puzzle.

Archaeologists of the Carnegie Institution of Washington recently reported efforts to restore this building which adorned the Mayan Indian city of Chichen Itza in Yucatan before the Spanish Conquest. The building, one of the most famous ruins in America, is called the Caracol, meaning in Spanish the Snail.

Starting in 1925, Carnegie archaeologists worked on the Caracol for six years in the winter season, when conditions are right for digging and clearing in tropical America. They report that the arduous task is accomplished. The graceful round building on its dignified stone terrace stands clean-looking, stripped of untidy undergrowth.

The upper story, which has inside a winding stairway in snail-shell pattern, is left incomplete. Long as they studied the ruins, the archaeologists still felt uncertain of the original plan for the tower. No other building in all the Mayan ruins of Yucatan offers a clue. Mayan architects rarely chose to construct round buildings. And the Caracol with its winding stairway and tower is unique, so far as the modern world has fathomed Mayan ruins.

What the building was used for is,

however, the major mystery. The Carnegie Institution states:

"To archaeologists the Caracol has proved to be an enigma, for they have been unable to decide with certainty what purpose it served or its date."

Even archaeologists of the Carnegie staff differ in their opinion as to the building's significance. Theories include: that the building was an astronomical observatory; a military or civil watch tower; a temple for worship of Kukulcan, great Feathered Serpent deity of the Mayas.

The favored theory is that the building combined several of these functions. Its tower contains a passageway oriented due west, as if to serve as a line of sight for astronomical observations. But science and religion mixed amicably in Mayan civilization; a headquarters for sun and star gazing might well be both a temple and a watch tower.

The Mayan people had to depend on astronomer-priests to tell them when to plant and harvest their maize, for the astronomers were guided by the sun's crossing the equator and other signs. Lucky and unlucky days also crept into every corner of Mayan life, as astrology mixed with astronomy. On all these matters, the layman consulted his advisers, the astronomer-priests.

*Science News Letter, February 1, 1936*

ARCHAEOLOGY

## Find First Evidence That Mayas Knew of Keystone

THE FIRST discovery in early American civilization of a keystone in building arches has just been reported by Dr. Alfonso Caso, excavating at Monte Alban, dead mountain-top city in the southern Mexican state of Oaxaca.

Some prehistoric Indian in Mexico, it now develops, discovered how to make a true arch. And yet, strange to relate, the builders of Mexico's beautiful temples did not hasten to use the new idea. It was invented, and forgotten.

The Indian arches continued to be magnificent, but being without keystones they were not self-supporting, and they were clumsy in comparison with the early buildings of the Greeks and Romans.

The keystone, in fact, is the distinguishing characteristic which marks the difference between Old and New World building construction in the days before the white man came to America.

The Mexican mason who stumbled on the principle of the keystone used it in constructing a Monte Alban tomb. But either he did not grasp its valuable significance and never used it again, or else his was but one small voice in the architectural wilderness. So far no other evidence of the use of the keystone has been found in the extensive Mayan structures.

Dr. Caso's find occurs in a tomb ceiling made by lean-to slabs. Gabled tomb ceilings made in this way are plentiful at Monte Alban and elsewhere but miss being true arches since their keystones are lacking.

The keystone tomb was found buried under three layers of plaster floor in the layer known to be next to the oldest in the city's history.

Technically the tomb will be recorded as No. 77 and is the richest since famous No. 7, which contained a remarkable treasure of gold and precious Indian stones.

*Science News Letter, February 1, 1936*

MINING

## Ducks Discover Gold For Russian Miners

DUCKS, nuzzling a muddy pond bottom near the village of Yemasn Pavlovo in the Ural Mountains, yielded gold nuggets when they were killed and their gizzards slit open. Prospectors immediately went out and found the "pay dirt" deposits from which the nuggets had washed into the pond.

*Science News Letter, February 1, 1936*

PUBLIC HEALTH

# A National Health Survey

**For the First Time, the United States is Taking Inventory of the Physical Condition of Citizens**

By **JOSEPHINE ROCHE**,  
Assistant Secretary of the Treasury  
In Charge of U.S. Public Health Service

**"H**OW IS the health of your family?" This is the question to be asked of 750,000 homes by the United States Public Health Service, in the nation's first health inventory. This survey is the largest health study ever undertaken by this or any other country. It will cost \$3,450,000, a sum allotted by the Works Progress Administration. In addition to providing work for a large number of persons, the goal of the inventory is to provide medical science with more complete knowledge as to how diseases and disabilities are distributed throughout the nation by geographical divisions, by age, by sex and by occupation.

A small army of "white-collar" workers, numbering about 6,000 are out in nineteen states, and during the next few months, in "house-to-house" interviews, they will seek the answers to questions about the general health of the family—questions, which, to the present time, have remained unanswered. The questions will, in the majority of the homes, be addressed to the home maker. Naturally, the home maker has the most detailed information as to the family health. Her most important duty is to keep the family well, to care for the family when there is sickness. The results of the Health Inventory, it is hoped, will, in the long run, be of great help to the home maker in keeping her family well.

## Picture of National Health

The health inventory is expected to provide a picture of the general health of the nation, rather than of exceptional conditions. Many valuable studies have been made of epidemic localities, of diseases such as leprosy, pellagra and parrot fever. While of vital importance, the prevalence of such diseases may be regarded as an exceptional health condition. The Public Health Service is interested not only in the serious disabling illness, but in the minor ones. How many are sick in this home on the day

the enumerator visits the family? How many have been sick during the past twelve months? What is the nature of these ailments? How much time has been lost from work or usual activity by the sufferers? Are there any additional chronic conditions, not apparent on the day of the enumerator's visit, but which are known to have been troubling a member of the family from time to time? These are some of the questions which the home maker or head of the household will be called upon to answer.

## Nineteen Representative States

The survey is expected to record the health condition of fully 3,000,000 Americans in 95 different communities. In order to get a comprehensive representation of the entire country, nineteen states were selected to represent each of the geographical divisions designated by the Census Bureau. In New England and Middle Atlantic States: Massachusetts, New York, New Jersey and Pennsylvania. In the South Atlantic area: Maryland, Virginia and Georgia. In the East and West North Central areas: Michigan, Illinois, Ohio, Minnesota and Missouri. In the Mountain and Pacific States: Utah, Washington, Oregon and California.

The information obtained in this survey is designed to help medical science chart its course in future efforts to learn the causes of sickness, to control disease, and even to cure disease. Very little is known about the prevalence of most sickness. Mortality statistics tell us how many persons die of heart disease every year. Mortality statistics tell us whether the death rates from heart ailments are increasing or decreasing. We know that these diseases are responsible for about one-fifth of the current death rate. But we do not know how many people are suffering from heart trouble today. We do not know where these cases are located, nor the age and sex of the sufferers. The same may be said of other chronic ailments, such as cancer, diabetes, arthritis, rheumatism, hay fever and goiter.

Family physicians keep records, it is



MISS JOSEPHINE ROCHE

true. But what of the person who is "ailing" from time to time, but has not yet sought medical assistance? State and local health departments collect statistics on the prevalence of such communicable diseases as infantile paralysis, diphtheria, smallpox. Some public health departments and private institutions have made similar surveys in restricted areas on specific diseases. Even where such records are available to the public, where health workers could study them with an eye to future prevention, the data are not correlated and are on a very small scale.

## Accidents in the Home

For example, the National Safety Council and the larger insurance companies tell us that one of the most frequent causes of temporary disability is the home accident—falls, burns, cuts, taking poison accidentally. The National Safety Council estimates some 5,000,000 temporary disabling home accidents in 1934, costing about \$640,000,000. There is serious need of more information regarding the frequency of home accidents and the situations in which they occur, for the above figures are only a rough estimate. A check-up as to the disability of seven days or longer and the length of time lost from work or usual activity from home and other ac-



cidents is one of the important jobs of the health inventory.

Great strides have been taken by medical science in lengthening the average span of life. Diseases which before were highly fatal have been cured, or at least arrested. Better sanitation has made it easier to keep well. Pure water supplies, milk sanitation, the control of malaria-infected areas, improvement in our knowledge of diet and the need for sunlight and fresh air are but a few of the blessings brought to the human race by medical science in the last half century.

### Babies Have a Better Chance

The appalling loss of human life during infancy and childhood became apparent when the twentieth century was but a few years old. Infant mortality and mortality from communicable diseases has been so greatly reduced in the past thirty years, that today, the average span of life has lengthened about twenty-one years. Babies born in 1870 had a chance to live to be forty years old; babies born in 1935 have a chance to live sixty-one years. The era in which we live marks impressive advances in transportation, communication, and industry. However, this little publicized increase in the life span may be regarded as the most notable advance made by the human race in any direction since the Middle Ages.

Statisticians of the U. S. Public Health Service tell us that this impressive decline in death rates from infant mortality and communicable or infectious diseases has gone hand-in-hand with an alarming increase in mortality from such diseases as cancer and heart failure.

In conquering the diseases particularly associated with the older age groups, medical science still has a long road to travel. To chart this course, we need facts—and many more facts than are now available. The goal of the survey is to discover facts that will result in providing the average man with greater security against the hazards of disabling illness.

The survey itself is a recognition of the fact that health services of the future will undoubtedly be expanded to cover fields other than the control and prevention of the communicable disease. The time, energy and money expended on the cure and control of such infectious diseases as typhoid, diphtheria and malaria have borne fruit. The future of the problems presented by chronic diseases and disabling illness looks no black-

er than did the future of the tuberculosis situation some years ago. What has been accomplished by medical science in the past can be confidently expected in the future.

The United States Public Health Service proposes, in the health inventory, to arm medical science with the weapon of new facts—a greater body of information than has yet been accumulated on the health conditions in our country.

The relation between income and illness is important to everyone, due to the tremendous cost in loss of income when a wage earner is ill, and in medical care when any member of the family is ill. Families with annual incomes of \$2,500 or under, according to careful estimates, show an average wage loss of \$900,000,000 a year, due to illness, and their costs of medical care are annually \$1,500,000,000—a total money loss of \$2,400,000,000. In order that this serious economic waste may be further analyzed, it is important to gain some idea as to the amount of time lost from work by the sick members of the family.

### Effects of the Depression

In the past two years, the Service began studies on the effect of loss of income upon public health. A survey of ten localities pointed to a greater problem than has yet been approached by Public Health officials—the economic waste of illness throughout the country. This study showed that the disabling illness rate was 56 per cent. higher among families hardest hit by the depression than it was among their more fortunate neighbors. Sickness among these "new poor" was more prevalent than among the "chronic poor" who had

been poverty-stricken even in 1929, a fact which suggests that ill health is associated with a sudden drop in the standard of living. The direct effect of unemployment is indicated by the fact that the sickness rate of families having no employed workers was 48 per cent. higher than the sickness rate of families with full-time workers and 14 per cent. higher than that of families with part-time workers only. These health and depression studies also focussed attention on an even broader field for scientific inquiry: the prevalence of current illness, chronic diseases and disabling handicaps.

### Statements Held Confidential

The house-to-house canvass is but one phase of the inventory. A more complete record of public health and medical facilities than has yet been made, will be acquired throughout the entire country, thus measuring more accurately the extent of availability of such facilities to the American people. Records of industrial sick-benefit associations will be studied in relation to occupation.

Public Health Service studies are interested only in facts and figures. Once the information given by a family has been tabulated it will be compiled in such a way that no name is used. All information, taken by accredited representatives, will be held in the strictest confidence. Facts collected in the national health inventory will be analyzed by scientists and statisticians skilled in appraising figures in their relation to human suffering. The new data, it is hoped, will lead to an increasingly effective program for national health.

*Science News Letter, February 1, 1936*



A FAMILY'S HEALTH HISTORY GOES INTO THE RECORD

## BIOLOGY

## Plant and Animal Cells Grow Well in Mixed Culture

**A**N ARTIFICIAL mutual aid society of mixed animal and plant cells that grew better together than they did separately, has been organized by Dr. Ralph Buchsbaum of the University of Chicago.

Dr. Buchsbaum received his inspiration from similar colonies of mixed organisms that occur in nature, in which both sides seem to receive some benefit. The phenomenon is known to biologists as symbiosis, which is made of two Greek words meaning simply "living together."

Dr. Buchsbaum arranged a symbiosis such as never occurred in nature. He took cells of a tissue culture of embryo chick, of the type first made by Dr. Alexis Carrel. Into this culture he mixed a quantity of one-celled lower green plants called *Chlorella* by botanists.

Growing alone, the *Chlorella* cells were pale and not very energetic, but in partnership with the chick tissue cells they thrive and multiplied, seeming to be quite happy in their strange partnership. Similarly, certain degenerative changes which appeared in chick cells grown without the companion plant cells did not put in an appearance in the mixed culture.

The commonly accepted theory of natural symbiosis is that the plant cells receive carbon dioxide and nitrogen from the animal cells, and in return provide them with part of the food they manufacture, together with the oxygen which is a by-product of food formation in plants. Dr. Buchsbaum is continuing his experiments, to see whether this or some other mechanism explains the success of his artificial mixed cultures.

*Science News Letter, February 1, 1936*

## ASTRONOMY

## 19-Ton Unit of 200-Inch Telescope Arrives in West

**T**HE LARGEST unit of the great 200-inch diameter telescope being built for California Institute of Technology has reached Pasadena, Calif., after an ocean voyage from the East by way of the Panama Canal. It is the lower end of the telescope tube, weighing 19 tons, which will eventually be the containing unit for the block of glass soon to be shipped from the Corning Glass Works.

Los Angeles and Pasadena, with their proximity to Hollywood, have seen

queer sights, but few more strange than the great wood-crated telescope unit being hauled slowly through the streets. It looked like some gigantic cheese, projecting over each side of the trailer by more than five feet.

The trip from San Pedro harbor to the laboratory took five hours, an average of only five miles an hour. Only the widest streets could be used.

Three more hours were spent in maneuvering the trailer up a ramp and around close clearances, with sometimes only three inches to spare, into the huge room where the frame is to be used first as a cell to hold the great glass disk while it is being ground and polished.

Once inside the grinding room, further skidding over greased steel plates was unnecessary. A great crane already tested with 60-ton loads picked up the unit and put it in place.

After serving as a holder for the glass disk during the mirror grinding, the frame will be moved to Mt. Palomar, where the new observatory is being built.

*Science News Letter, February 1, 1936*

## PALEONTOLOGY

## Elephant Fossils Show Plains Were Once Forest

**E**LEPHANTS were the "thundering herd" of the West, in great forests where the Great Plains are now, declares Dr. Erwin Barbour of the University of Nebraska. In what is now the driest part of Nebraska, where only short grasses will grow, there have been uncovered literally tons of fossil elephant bones, representing at least thirty or forty species of the great beasts.

There were elephants among them beyond the wildest dreams of the present-day circus-going small boy. Elephants with seven-foot tusks, elephants with shovel-shaped tusks, elephants with four tusks apiece, elephants with no tusks at all. They reigned over what is now the central Great Plains area for some millions of years before and during the Great Ice Age.

Presence of so many and so varied elephants, Dr. Barbour holds, is evidence that the Great Plains were once forests rather than dry grasslands. Elephants love the woods. A big elephant needs about a ton of green fodder a day. And grasslands cannot supply this quantity of provender, while forests can. The West, then, must be thought of as a jungle rather than a pasture, in the days when the elephants roamed.

*Science News Letter, February 1, 1936*

# IN SCIENCE

## PHYSIOLOGY

## Normal Individuals Not Helped by "Pep-Up" Drugs

**D**ON'T expect to pep yourself up with coffee, alcohol, cocaine, morphine, strychnine, insulin, and adrenalin if you are a normal healthy person, just because they help sick people.

Drugs that are good for weak individuals may have an entirely opposite effect on one in good health, Dr. Walter R. Miles of Yale University, reports. Dr. Miles reached his conclusions after a series of experiments with animals demonstrating this dual action of common drugs on efficiency as shown by ability to run a maze.

The normal rat is not aided by any one of the drugs tried. But a blind rat, that is lacking in muscle tone, lying soft and limp in your hand if you pick it up, is helped by strychnine, by cocaine, and by thyroxin.

Neither caffeine nor alcohol helped them at all.

Morphine and insulin both reduced their skill somewhat and adrenalin had an even more disadvantageous effect.

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## ENTOMOLOGY

## Flying Grasshoppers Sing With Hind Wings Only

**H**OW DO flying grasshoppers produce the shrill song they utter as they sail through the air?

Naturalists have puzzled over this not a little. And disputed a bit over it, too. European scientists have held that the insects rub their wings together, while their American colleagues have claimed that they rub their wings against the wing-covers, which are toughened and hardened forewings. (Grasshoppers are fairly "typical" insects, in that they have two pairs of wings.)

Prof. F. B. Isely of Trinity University, Waxahachie, Texas, settled the question very simply. He caught a lot of the long-winged noisemakers and removed their wing-covers. Then he let them fly. They produced their shrill song just as well as ever.

*Science News Letter, February 1, 1936*



# NE FIELDS

## MEDICINE

### Safer Vaccines Made By Chemical Treatment

**P**ROMISE of a way to make safe vaccines against diseases for which there are as yet no safe vaccines appears in a report of Drs. Joseph T. Tamura and M. J. Boyd of the University of Cincinnati College of Medicine.

Instead of killing the disease germ by heat to make a vaccine, these investigators treat it with ketene. This chemical is produced by decomposing acetone, the chemical used in finger-nail polish remover.

Germs that cause dysentery were treated with ketene and used to vaccinate rabbits. The vaccinated animals were immune to doses of the untreated bacillus which killed unvaccinated rabbits in four days, the investigators report. (*Science*, Jan. 17)

While the investigations of the Cincinnati scientists were limited to one kind of "germ"—*B. dysenteriae* Shiga, by scientific name—it may develop that ketene can be used to detoxify the organisms that cause other diseases, so that they can be safely used for vaccination.

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## MEDICINE

### TB Sanatoriums in U. S. Are Rated as "Fine"

**T**HE MOST complete data ever obtained on the hospitalization of tuberculosis patients in the United States are presented by the American Medical Association in its Journal. (Dec. 7)

American sanatoriums, or hospitals for the tuberculous, provide beds for 95,198 patients and are on the whole fine institutions, the survey shows. Sixty per cent. of their patients are definitely improved by the treatment given. These special hospitals represent an investment of \$330,000,000, including land, buildings and equipment. Veterans' hospitals for the tuberculous cost on the average \$4,000 a bed. In most other institutions, both private and public, the cost per bed is less, but there are extremes in variation.

Elaborate plants and expensive equipment bring the cost of some tuberculosis hospitals as high as \$10,000 a bed. One sanatorium built with public money cost \$13,043 a bed.

The use of tuberculosis departments in general hospitals has been endorsed by the American Medical Association, the American Hospital Association and the National Tuberculosis Association. The endorsement, however, requires adequate segregation for the protection of other patients and personnel.

In a few of the sanatoriums, the survey revealed, adults and children are allowed to associate in various ways. In a few cases, too, it was found that children with tuberculosis of the lungs were hospitalized with children in the preventorium unit. Such conditions call for prompt correction, the Association's Journal makes plain in an editorial commenting on the survey.

No attempt was made to give a relative rating to the individual institutions. The comment that would characterize the tuberculosis institutions of the United States in general would in most cases be commendatory, states the Association's council on medical education and hospitals, under whose direction the survey was made.

*Science News Letter, February 1, 1936*

## ECOLOGY

### Northern Insects Found In West Florida Ravines

**L**ONG before Northerners started going to Florida for the winter, other creatures in the North had the same idea. And some of them stayed.

Colonies of the curious long-legged insects called crane flies—which many people mistake for big mosquitoes, and mistreat accordingly—that have been found in moist ravines of western Florida have a decidedly Northern aspect. R. Edward Bellamy of the University of Florida has found such a "disjunct" crane fly colony in a spot only four miles north of Tallahassee, known as Hydrangea Ravine because of its abundance of wild hydrangeas. The northerly aspect of the region is emphasized by the curious character of the forest there, which is composed of a mixture of the beech of Northern woods and the magnolia of the South.

Similar isolated colonies of Northern insects have been found elsewhere in western Florida by Prof. J. Speed Rogers, head of the zoology department of the University, Mr. Bellamy said.

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## MINING

### Soviets Set Coal Mines Afire for Gas Content

**I**N SIBERIA and in North Caucasia, U.S.S.R. mining engineers are burning coal mines underground for their gas content. Suggested by the famous British chemist Sir William Ramsay before the turn of the century as the most economical way to use coal deposits of the lower grades, the scheme of coal gasification projects has been little used elsewhere in the world.

Sir William argued logically that for many purposes it was wasteful to dig mines and extensive cross shafts, send men down to dig out the coal, ship it hundreds and thousands of miles and finally burn it to make coal gas for illumination, cooking and power. He recommended setting a coal deposit afire and then by controlled draft and flues leading away the coal gas to the surface.

According to Russian tests the labor spent on the gas is only from one-tenth to one-sixth of that needed in mining. Moreover, it is possible to obtain gas from very narrow seams of buried coal which would be unprofitable to mine in the ordinary sense.

In the process of burning coal beds for their gas content, a shaft is dug down to the coal and exhaust outlets sunk in other places over the coal deposit. The coal is ignited at the main shaft and air forced down to sustain combustion. The fumes from the burning coal are sucked out the exhaust pipes only partially burned. There is much carbon monoxide present, for example, which can be piped to the site of use, or used by industry near the coal gas source.

*Science News Letter, February 1, 1936*

## BOTANY

### Sixty-Foot Tobacco Plants Found Growing in Andes

**T**OBACCO plants as tall as trees, "unbelievable and unforgettable," are among the strange vegetation of the Andean country now being investigated by an expedition from the University of California, under Prof. T. H. Goodspeed. One of the tremendous tobacco growths measured by Prof. Goodspeed was sixty feet high.

The expedition is engaged primarily in a search for wild relatives of the common cultivated tobaccos, to be used in hybridization experiments.

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PUBLIC HEALTH

# More Than 1,000,000 in U.S. Are Exposed to Silicosis

## Not Often Fatal in Itself, Malady Opens Road for Tuberculosis and Other Very Serious Diseases

**M**ORE than one million Americans are exposed to silica dust, the condition which may cause silicosis, sometimes called "miners' phthisis" or "miners' consumption," according to estimates of the U. S. Public Health Service.

Silicosis may affect not only workers engaged in rock cutting, as in the cases reported from Gauley Bridge, W. Va., which are attracting Congressional notice, but also those in the pottery, foundry, sand-blasting, abrasive, granite, tool and ax grinding, glass, slate, silica grinding and mining industries.

Not all those exposed to the dust get the disease, however. Probably one-fourth of any large group exposed to the dust at any one time have silicosis, and most of those have it in the early stage.

Very few people die of silicosis. Silicosis patients usually die of some infection, particularly tuberculosis, to which they are especially susceptible.

Men having silicosis in the first stage of the disease have slight or no disability, and may never have any disability, if placed in suitable surroundings. This does not mean that they must necessarily change their occupation. The surroundings in which they work can be made "suitable" by eliminating the silica dust from the air in which they work, or by reducing it to a safe limit. Men suffering from the disease in its second stage can improve materially, and even those suffering with the third stage of the disease can improve somewhat in "suitable" surroundings. The federal health service knows of no industry at the present time where the conditions causing silicosis cannot be controlled.

In silicosis the lungs, instead of being spongy tissues with plenty of space for the air to circulate, become mottled with patches of fibrous tissue which is dense and prevents the passage of air. As the disease progresses, the patient has less and less normal lung tissue for breathing.

Shortness of breath on exertion and sometimes a cough are the first symp-

toms of silicosis. In the early stages, however, the patients often do not know that they have the disease. They feel all right and are able to go on working and living normally. They even may and frequently do gain weight. It is when tuberculosis or some other infection sets in that the patients begin to lose weight and feel badly.

To prevent silicosis the U. S. Public Health Service recommends a combination of measures, no one alone being successful. These preventive measures are: methods of control of the dust at its source; good ventilation to dilute the amount of silica dust in the air; and physical examinations of the workers at the beginning of employment and periodically thereafter, to detect the presence of silicosis, and, even more important, of tuberculosis.

Conditions in practically all the silicosis-producing industries are definitely improving, according to the U. S. Public Health Service, but the surface has only been scratched and there is much dust yet to be controlled.

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PHYSICS

## New X-Ray Technique Aids Against Silicosis

**A** NEW tool of science to combat industrial dust diseases like silicosis has been developed by Prof. George L. Clark and Dexter H. Reynolds of the University of Illinois.

Silicosis is the occupational disease caused by breathing rock dust containing fine silica, especially in the form of quartz, and is claimed to have been responsible for the numerous deaths at the Gauley Bridge, West Virginia, power tunnel now under Congressional investigation.

The new Illinois method is based on obtaining what amount to X-ray "fingerprints" of the quartz dust in a given sample of air from mine or factory. Not only is the kind of mineral present determined but the amount also is measured.

The dust from mine air is pulverized to a fine powder whose particles are smaller than one two-hundredths of an inch in diameter.

The dust powder is molded into a small wedge-shaped mass and placed in the X-ray analyzer. X-rays are then passed through the dust wedge and strike a sensitive photographic film which records an X-ray spectrum characteristic of the minerals composing the dust. This fingerprint spectrum tells what is present but without further research says nothing about the amount of each material present.

To determine how much quartz is in the sample of mine dust, a pure crystalline powder known not to be present is added to the sample in a given amount, say ten per cent.

The X-ray spectrum of this mixture is then recorded. The ratio of relative blackness of the X-ray lines of the known material to the blackness of the X-ray lines due to quartz in the dust samples is then determined. The ratio of line blackness is proportional to the amount of the quartz present in the dust, and can be converted into percentage amounts. The method is accurate to five per cent.

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MUSIC-PHYSICS

## Photographs of the Voice Take Mystery From Singing

**S**OME of the mysticism is disappearing from the methods of voice training that yield the opera and concert singer through years of exacting study.

New facts about the mental imagery of singing by "getting it up"—"forward"—"against the teeth"—and "all through the head" are coming to light in studies being conducted at the Peabody Conservatory of Music at Baltimore.

When the voice teacher tells the aspiring voice student to "get the tone up" or "place the tone forward" or any one of a large number of similar figures of speech, he is attempting (often without realizing it) to secure relaxation of the swallowing muscles, says Wilmer T. Bartholomew of the Conservatory. These muscles often spoil good tone-quality by constricting the throat.

For six years the research department of the Conservatory has been studying voice production. Instruments like the oscillograph, which turn sounds of the singing voice into electrical impulses and make possible voice "photographs," have given definite facts regarding the



characteristics of what is vaguely termed a "good singing" voice.

From the thousand and more oscillograph records a hitherto unreported frequency in the band of sound waves from E flat to F sharp of the last octave on the piano has been discovered in the well-produced voices of men. This is the "ring" of the voice, and occurs in considerable amounts, and at the same frequency, regardless of the fundamental pitch or the vowel being sung.

All the attributes of good vocal quality, declares Mr. Bartholomew, tend to appear when the throat is enlarged, as many voice teachers have long known. Such teachers use many types of mental imagery to help the pupil relax the swallowing muscles that tend to tighten the throat. Different types of imagery have equal success and appear to help in building up psychological aids in securing correct muscular settings, which is often awkward for the beginner.

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#### AGRONOMY

## Conservation Would Withdraw Same Acreage as A.A.A.

**S**OIL conservation rentals, to withdraw erosion-threatened land from the plow and put it into pastures, trees or other permanent vegetation, will retire just about the same number of acres as were taken out by the restriction agreements under A.A.A., if new legislation now pending before Congress is enacted.

At a conference in his office, Secretary of Agriculture Wallace disclosed this estimate, based on a survey made for him by the Soil Erosion Service last autumn, when the complete destruction of A.A.A. was not even thought of.

The survey was made of lands on unsafely steep slopes, now in the three big money crops, wheat, corn and cotton. The slopes are in the classes called C and D by the Soil Conservation Service. C slopes are those that must be put into grass to prevent their rapid ruin through erosion. D slopes cannot be saved even by permanent grass, but must be held by deeper-rooted trees.

The survey indicated that 35 million acres of the three crops are now being grown on such slopes. A.A.A. withdrawals in 1935 amounted to 30 million acres; in 1934 they were 35 million acres. The net result of the new scheme



LIKE A LICTOR'S AX

#### FORESTRY

## New Foresters' Tool Looks Like Symbolic Fascist Ax

**A** NEW-TYPE tree pruning tool looking like the symbolic ax that thrusts its blade from among the bundle of rods in the Fascist emblem will soon be appearing on the shoulders of foresters going into American woods so that they can aid young trees to grow up straight and produce knot-free lumber.

The steel blade, however, will be a real working tool, not a political emblem. And it will not be an ax, for it will be sharpened not on its outer edge but at top and bottom.

The tool is the invention of J. H. Rich of Massachusetts State College. It consists essentially of a rectangular piece of steel, with half-moon-shaped concavities cut into top and bottom sides. These are whetted to razor edges. The blade is socketed on the end of a pole.

In use, the upper edge is first set against the under side of the branch to be pruned, and the forester gives it a quick thrust. Then he hooks the lower edge over the top of the branch, and gives it a firm pull. The two cuts meet, shearing the branch off cleanly. The forester swings the pole a little to one side so that the falling branch will not strike him, and goes after the next branch.

The tool is intended for use on small branches only, and will not replace the pruning saw for larger-sized jobs. But the inventor claims that it is much superior to the saw within its scope, particularly on branches from six to seventeen feet up the trunk.

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#### VETERINARY MEDICINE

## New Hog-Cholera Vaccine Promises Better Results

**P**IGS WILL be better protected against their worst disease, hog cholera, by a new vaccine now under investigation by research workers of the U. S. Department of Agriculture. Crystal violet, a chemical not hitherto used in preparing such vaccines, appears to be the key to its greater effectiveness.

In preparing hog cholera vaccines in the past, three other chemicals have been used: glycerin, formalin and phenol. Vaccines generally are made by adding to blood serum containing the virus of the disease some chemical that will weaken its power to harm, yet not de-

of acreage withdrawal, pointed especially at soil conservation rather than the elimination of price-depressing surplus production, would be to shift the uncultivated acres to places where they would do the most good to the nation's land itself.

Even these withdrawals will not wholly meet the situation produced by the destruction of America's foreign markets through ultra-nationalistic measures taken by European governments, Secretary Wallace indicated. To cut our production to this level, 50 million acres would have to be taken out of the major farm crops. Hope that such drastic action will never be necessary was expressed by the Secretary, who looks for a return, sooner or later, of "world sanity."

Even more sweeping cuts in acreage, to meet the soil erosion and soil exhaustion problems to the very limit, have been proposed by persons not connected with the Government. These have run as high as 30 per cent. of all our crop lands, and would mean reductions on the order of 100 million acres. This figure is not thought of as a serious possibility by Secretary Wallace.

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stroy its ability to provoke the formation of disease-preventing "anti-bodies" in the blood of the animal or person to be protected. Crystal violet appears to be a much more advantageous material to use for this purpose than any of the three older chemicals.

One of the disadvantages of preventive treatments now in use for hog cholera has been the necessity of using unmodified disease-bearing serum along with them and hog cholera virus, even under veterinary precautions, is not very welcome on a farm. The new treatment promises to do away with this part of the treatment.

One thing that must be determined,

however, before the crystal-violet vaccine is put into use, is its time-lag. At present it appears to take about two weeks for it to become effective; so its use in emergencies might be under some handicap.

Its cost, for large-scale use, cannot be determined until mass production is undertaken, but it is believed that it will be materially less expensive than the preventive treatments now in vogue.

Crystal violet is a dyestuff belonging to the large anilin family of chemicals. Its common name is used as a matter of convenience instead of its longer technical title: hexa-methyl-para-rosanilin.

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#### CLIMATOLOGY

## 1935 Wetter Than 1934, Also Somewhat Cooler

**D**ROUGHT and heat were rampant in 1934; broken in 1935. Popular impressions on these points receive confirmation and emphasis from a comparative study of weather records of the two years, which has just been completed by the U. S. Weather Bureau.

For the year as a whole, the meteorologists state, the temperature averaged somewhat higher than normal all over the country, except for two limited areas of slightly below-normal temperatures in the Northeast and Northwest. Yet they were still below the quite abnormally high figures for 1934.

The Bureau scientists summarize highs and lows: "The lowest temperature reported in 1935 was 51 degrees below zero at Pine River Dam, Minn., but Grantsburg, Wis., was a close second with fifty degrees below, both occurring in January. The highest for the year was 123 degrees at Cow Creek, Calif.,

in July. This compares with a low of 52 degrees below zero at Stillwater Reservoir, N. Y., and a high of 125 degrees in Death Valley, Calif., for the preceding year. The highest and lowest all-time temperature records for the United States are 134 degrees in Death Valley, Calif., and minus 66 degrees in Yellowstone Park, Wyo."

Rainfall for 1935 far exceeded that for the previous year, even in regions where it still fell short of normal. It did fall below normal in two regions usually accounted rather moist, the Great Lakes region and the Southeast. Elsewhere, especially in the greater part of the traditionally drier West, there was rainfall ranging from slightly below to decidedly above normal.

The Weather Bureau study summarizes: "Except very locally, the only section of the country having less precipitation in 1935 than in 1934 was the Pacific Northwest, while on the other hand, large areas, especially the interior valleys and Great Plains, seriously dry in 1934, had approximately normal to considerably above normal precipitation in 1935."

"An outstanding feature of the year's weather was the persistent spring wetness in the interior valleys. At the beginning of 1936, the soil-moisture situation generally was satisfactory over the eastern half of the country, but most of the western half was still needing precipitation, though heavy rains and snows occurred over the Pacific Northwest during the first two weeks in 1936."

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#### GEOPHYSICS

## North America Being Pulled Into Pacific Ocean

**N**ORTH America is being pulled into the Pacific Ocean by the attraction of the dense layers of the earth's crust which are below the bottom of the Pacific. This in substance is the conclusion of an investigation reported by Dr. Ross Gunn of the U. S. Naval Research Laboratory.

The movement results in a great thickening of light material on the forward edge of the moving continent, which well accounts for the growth of mountain ranges like the Sierra Nevada in the Pacific coast states, adds Dr. Gunn in his report to the *Physical Review*.

Measurements on the velocity of sound waves, states Dr. Gunn, indicate that layers under the Pacific Ocean have a density greater than similar layers underlying the continents. This dense mass of material produces a component of gravitational force at an angle to the normal vertical pull of gravity.

It is this sidewise or tangential pull of gravity which is tugging North America gradually westward, according to Dr. Gunn's findings.

The geophysical evidence, Dr. Gunn maintains, substantiates his earlier papers concerning the origin of the solar system.

Dr. Gunn has shown that a star can acquire sufficient angular velocity to split into two parts. As the parts separate, while revolving around one another, enormous tidal forces are set up which cause both parts of the original star to lose pieces of themselves that eventually become planets. These planets, as they fly off, are hotter on one side than on the other.

It is this difference of temperature, Dr. Gunn has maintained, which ultimately accounts for the uneven distribution of the continental and oceanic hemispheres of the earth, the lopsidedness of the earth's magnetic field and the uneven distribution of the density in the various layers of the now-cooled earth's crust.

It is the last point, the much greater density of the earth's crust beneath the Pacific Ocean, that accounts for the tangential gravitational force that moves North America westward.

Tangential forces in regions of sedimentation and crustal weakness, explains Dr. Gunn, cause overthrusting of the outer layers. The overthrusting ultimately results in the observed mountain changes.

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## ORADIO

February 4, 4:30 p. m., E.S.T.

A FUTURE FOR AMERICA'S BIRDS AND BEASTS — Ira N. Gabrielson, Chief of the U. S. Bureau of Biological Survey.

February 11, 4:30 p. m., E.S.T.

THE CRIMINAL MIND — Dr. John E. Lind, St. Elizabeth's Hospital, Washington, D. C.

In the Science Service series of radio discussions led by Watson Davis, Director, over the Columbia Broadcasting System.

## PHYSICS

# New Optical Material Eliminates Headlight Glare

**A** NEW optical material which promises to save thousands of lives now snuffed out in night driving because of headlight glare is announced by the Land Wheelwright Laboratories, Boston.

Known as polaroid, the new material is also to be used for sun glasses which take away light dazzle without darkening the view, and even more important, make possible motion pictures in three dimensions that have the optical illusion of depth similar to viewing a scene with the naked eye.

Other uses promised include one-way glass for cross-court privacy in apartment buildings, and also for brilliant building exteriors that change color as one walks by.

Polaroid resembles a sheet of glass but has the ability to polarize the light which passes through it. Now ready to be produced in unlimited quantities, the new material is the first practical use of what has formerly been a laboratory and research phenomenon.

Polarized light is light which vibrates only in one direction in contrast to the helter-skelter vibrations at right angles to the line of travel as in the ordinary light ray. Polaroid acts to produce the polarized light.

Best way to think of the complicated phenomenon is to regard ordinary light vibrations as a mass of straws tossed up in a wind. They are blown against a picket fence. All straws are stopped except those parallel to the slats in the fence and all straws coming through are lined up in one direction. The material polaroid acts as the picket fence.

For use in automobiles all headlights would send out polarized light vibrating in one direction and all windshields would be "crossed" so that they would not permit such headlight rays to enter and blind the driver.

The light from one's own headlights would strike the ground ahead, be scattered with a destruction of the polarization and hence such light would enter the car and make possible vision down the road just as headlights act now.

The American Optical Co., Southbridge, Mass., has been licensed to manufacture the new sun glasses, and the Eastman Kodak Co. will produce

polascreens, a special form of the material, which will make possible movies with depth.

The three-dimensional motion pictures are taken with a double camera having two lenses as far apart as the human eyes. When such films are shown the two views are projected on

## METALLURGY

# Incas Had so Much Gold They Used it For Pins and Nails

**G**REECE had a Golden Age of fable, the Renaissance had its Golden Age of literature, moderns boast of a Golden Age of science. But South America is one of the few spots in the world that ever had a Golden Age of actual gold.

In Ecuador, the golden ornaments of the natives amazed the first Spanish conquerors who came, saw, and took what they wanted back home. What is not so generally known is that the use of gold was so widespread that not only ornaments but such prosaic articles as fish-hooks, sewing needles, safety pins and hooks and eyes were made of the precious metal. Even gold nails have been found.

More than that, the Indians alloyed platinum with gold to produce a whiter metal. How they did it has long been a mystery because no fire which the natives had yielded a flame with sufficient temperature to reach platinum's melting point, 3,224 degrees Fahrenheit.

New discoveries, however, are piercing the gloom of the mystery, according to the Danish scientist Paul Bergsoe of Copenhagen, who describes how articles have been found, fortunately, in all the various stages of fabrication from start to finish. (*Nature*, Jan. 4)

From this cross section of prehistoric South American metallurgy it is possible to reconstruct the method of making the platinum gold alloy objects.

Grains of platinum were mixed with a little gold dust and the two burned with wood charcoal. A blowpipe supplied the needed draft of air to attain

the same screen through polarizing sheets at right angles to each other. The audience, supplied with glasses fitted with clear colorless polarizing lenses set at corresponding angles, sees one image with the left eye, the other with the right and gets the effect of actual presence at the scene. The world's first three-dimensional color movies have already been produced with the system.

For use in sun glasses the lenses of polaroid material discriminate between glare which is polarized and useful illumination which is not, and so cuts off the glare without obscuring the view.

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the maximum temperature. While the platinum would not melt in the flame the gold did and served as a sort of binding cement to hold the platinum grains.

It is known that melted metal slowly diffuses into the unmelted portion during a long heating. The unmelted metal, in turn, partly dissolves into the melted one. The result is a sinterous mass which under later hammering and cold working becomes so homogeneous that it can be fashioned into plates or other objects.

Gold-platinum wire was also made by drawing small bars down to diameters as little as four one-thousandths of an inch. Such tiny size precludes the use of dies for drawing the wires, states Mr. Bergsoe.

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## MATHEMATICS

# 1936, Square of 44, Last "Square" Year Until 2025

**I**F YOU tire of writing 1936 after dates during the current year you can instead write 44<sup>2</sup>. Dr. Donald P. LeGalley, of the physics department of Pennsylvania State College, calls attention to the fact that this is the first time since 1849 that the year has resulted from a perfect square, and it will not happen again until 2025 A.D., according to Dr. LeGalley.

Perfect square years also occurred in 1764 and in 1681.

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Shadowy Superstition

See Front Cover  
**G**ROUNDHOG Day is one of those curious superstitions that persist even after they have been well discredited and generally disbelieved. Probably nobody thinks that six more weeks of winter will ensue if the sun shines on the morning of February 2, but everybody talks about it in terms of the gravest belief. It has become one of those straight-faced public jokes that is almost a public ritual.

The assumption is always made, of course, that if the sun shines the groundhog will really see his shadow. As a matter of sober zoological fact, the groundhog never sees his shadow on the morning of February 2, though the winter sun should shine brighter than it does in June.

The reason is that groundhog simply isn't there to see any shadow. The groundhog is a hibernating animal, and he sleeps soundly in the innermost recesses of his burrow until about the end of the first week in March, and even later in the more northerly portions of the country. The very earliest record of an observation of a groundhog is a February 7 date in the Middle South—five days too late for Groundhog Day shadow-observing purposes.

The Groundhog Day superstition is older than its name. In various parts of Europe, other hibernating animals, especially the bear and the hedgehog, are burdened with responsibility for the weather of late winter. The groundhog is an American animal. It seems to have received its meteorological job from European colonists who believed in the hedgehog, for the hedgehog is strictly Old-World in its habitat. Lacking the

hedgehog as a bad-weather "goat," the settlers found the groundhog a ready substitute.

The superstition may very well be older than the date on which we expect the groundhog to come forth and do his shadow-gazing. Candlemas day is an important feast of the Church—it gets its name from the fact that the altar candles for use during the whole year are formally blessed on that day: the "candle

Mass." But there is nothing in the rubric about the weather. Not unlikely some old Pagan belief about the importance for the subsequent course of the weather, about the first of February, was dragged into the Christian feast by converts who could not entirely put off the works of their older darkness. Anyhow, the superstition did manage to creep in, and it is still with us.

*Science News Letter, February 1, 1936*

## PHYSICS

## New Aid for Atom Study Announced at Ohio State

**S**TILL another new tool by which science can probe the secrets of the atom and effect transmutation of the elements has been developed at Ohio State University, according to an announcement from the department of physics and astronomy.

The new weapon of science is the first successful production of strong narrow beams of negatively charged hydrogen atoms which can serve as "bullets" for use in atom bombardment research. It is the work of Dr. Willard H. Bennett and Paul Darby of the physics department.

The hydrogen atom normally consists of one positively charged nucleus called the proton, and one negatively charged electron. It is now well known that these electrons can be knocked off and beams of protons or positively charged hydrogen atoms obtained. Positive ion beams of most elements have been familiar in laboratories for 30 years or more.

But never before, according to Ohio State scientists, has anyone been able to attach extra electrons to atoms and make them stick in sufficient quantity to ob-

tain beams of negatively charged ions.

Production of the negative ions in quantity is described as having far-reaching effects in research with the new million volt tube at Ohio State by which transmutation of the elements is effected.

Since scientists previously have been unable to obtain negative beams of any element, the physical properties of such ions themselves hold great interest and will be a subject for further study. They are thought to play a decisive role in the production of striations in glow discharge, a familiar case of which is the discharge in a neon sign.

An "electron microscope" played a prominent part in the discovery of these beams. This "microscope" is a vacuum tube whose parts focus the beams of charged particles on a screen, just as the lenses in an ordinary microscope focus the beams of light on a screen.

In the work at Ohio State, the "microscope" was so used that ions of all masses and charges could be focussed on one screen and then separated by a transverse magnetic field.

*Science News Letter, February 1, 1936*



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# •First Glances at New Books

## Industrial Chemistry

**MEN, MONEY AND MOLECULES**—William Haynes — *Doubleday, Doran*, 186 p., \$1.50. Subtitled "Three hundred years of industrial chemistry in the United States," it includes particularly a record of America's great molecule-rearranging industries since the World War. We make more chemicals, measured either in tons or dollars, than are produced in Germany, England, France, Italy, Japan and Russia all added together. Since firms are named and statistics are given, the volume is useful to those interested in serious information. But this does not mean that it is not readable, for it is. Dedicated quite appropriately to Francis P. Garvan, president of the Chemical Foundation.

*Science News Letter, February 1, 1936*

## Juvenile Literature

**TALKING WIRES** — Clara Lambert—*Macmillan*, 72 p., \$2. A picture-book about one great and now well-nigh universally used invention, calculated to impress the youthful reader with the wonders and romance of telephony.

*Science News Letter, February 1, 1936*

## Ciphers

**THE A B C OF SECRET WRITING**—Col. Parker Hitt—*Puck Products Co.*, 36 p., \$1. The rudiments of breaking cipher messages of the substitution and transposition types. How to use letter frequency tables and figure out multiple alphabet ciphers. Just enough information is given to whet one's interest in the fascinating business of solving cryptograms.

*Science News Letter, February 1, 1936*

## Photography

**PHOTOGRAPHIC ENLARGING**—Franklin I. Jordan—*Folmer Graflex Corp.*, 224 p., \$3.50. Good and useful advice upon making big ones out of little ones, attractively illustrated.

*Science News Letter, February 1, 1936*

## History of Science

**THE BEGINNINGS OF PLANT HYBRIDIZATION** — Conway Zirkle — *Univ. of Penn. Press*, 231 p., \$2.50. All modern agriculture and horticulture is based on hybridization; there is scarcely a field or garden herb, or orchard tree or berry, that is not a hybrid. Yet plant breeders, outside the experiment stations, usually know little more about the science that

underlies their technique than did Assyrian date growers or Romans capriciating figs. For this reason, this meatily written, well illustrated history of plant hybridization should be in the hands not only of plant scientists (who can be taken for granted as readers) but also of practical seed growers and nurserymen.

*Science News Letter, February 1, 1936*

## General Science

**MEN AND MOUNTAINS**—M. Ilin—*Lippincott Co.*, 330 p., \$2.50. Maxim Gorky in his preface calls this "a prose poem about what is actually happening at the present time." This is a spine-prickling exposition of man's struggle with nature. You may not agree with its economics—although you may—for the scene is the U. S. S. R. Would that we in America had more books as effective as this one! Making over deserts, creating new plants, making the map live, bridling rivers, doing something about the weather—these are among the epics told.

*Science News Letter, February 1, 1936*

## Bacteriology

**THE QUESTION OF LIVING BACTERIA IN STONY METEORITES**—Sharat Kumar Roy—*Field Museum of Natural Hist.*, p. 179-198, 20c. The author has repeated the experiments of Lippman, using the same technique and materials from the same meteorites. The results are negative.

*Science News Letter, February 1, 1936*

## Engineering

**STRENGTH AND RELATED PROPERTIES OF WOODS GROWN IN THE UNITED STATES**—L. J. Markwardt and T. R. C. Wilson—*Gov. Print. Off.*, 99 p., 22 tables, 25c. A discussion of the engineering properties of wood, with many tables; it will be useful to any one who has to do with timber structures.

*Science News Letter, February 1, 1936*

## Ichthyology

**A NEW GENUS OF OPISTHOGNATHID FISHES**—George S. Myers—*Smithsonian Institution*, 5 p., 5c.

*Science News Letter, February 1, 1936*

## Botany

**POLLEN GRAINS, THEIR STRUCTURE, IDENTIFICATION AND SIGNIFICANCE IN SCIENCE AND MEDICINE**—R. P. Wodehouse—*McGraw-Hill*, 574 p., \$6. There has not hitherto been a special book on the subject of pollens; and this one covers the field so thoroughly that there need not be another for a long time to come. It will be welcomed by botanists, both paleobotanists and those concerned with living plants, and also by physicians and pathologists struggling with the ever-growing problem of pollen allergies.

*Science News Letter, February 1, 1936*

## Education

**THE SCHOOL IN THE CAMPS**—Frank Ernest Hill—*Amer. Assn. for Adult Education*, 84 p., Free. A readable history of a novel venture in adult education—the educational program of the Civilian Conservation Corps.

*Science News Letter, February 1, 1936*

## Poetry

**CIRRUS FROM THE WEST** — Paul Southworth Bliss—*Lakeside Press*, Chicago, 51 p., \$1.50. A new volume of verse from a poet who is building an increasing reputation as an interpreter of nature; illustrated, as previous ones have been, with woodcuts by Harold J. Matthews. The sky is very much over this little book, and winds that smell of the Prairies and the Plains.

*Science News Letter, February 1, 1936*

## Nature Study

**TREES, STARS AND BIRDS**—Edwin L. Moseley—*World Book Co.*, 410 p., 16 colored plates, \$1.60. Revised edition of a successful text for elementary schools.

*Science News Letter, February 1, 1936*

## Traffic Regulation

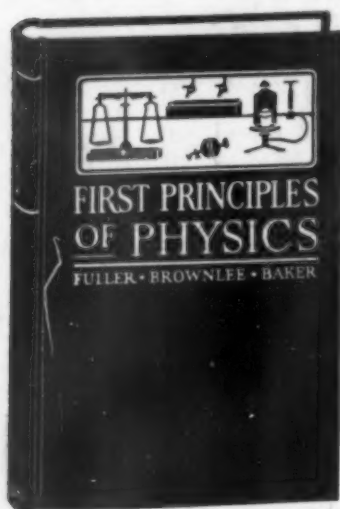
**COLLISIONS IN STREET AND HIGHWAY TRANSPORTATION** — Barry Mulligan—*Dorrance & Co.*, 310 p., \$3. Correction of price given incorrectly in SCIENCE NEWS LETTER of January 18, 1936.

*Science News Letter, February 1, 1936*

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# PHYSICS AND HUMAN PROGRESS

**R**ECENT EVENTS throw into striking relief the contributions which science in general and physics in particular have made to human progress. The first event, the death of General Greely recalls the heroic struggle of his party of twenty-five men some fifty years ago. For nearly three years they lost all contact with the outside world, and when the rescue party found them only six were alive.



The experience of Greely's party brings to mind the famous expedition of Sir John Franklin and its tragic end, and the later expedition of Scott, which successfully reached the South Pole, but also ended in tragedy when the party perished before they could get back to their base.

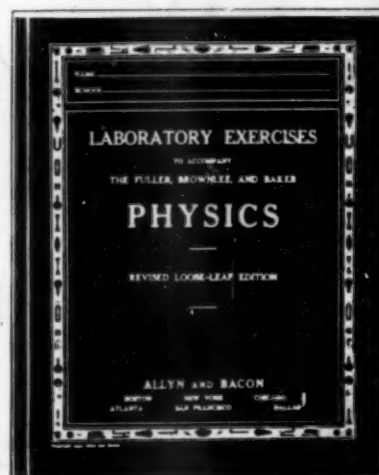
These heroic expeditions and those of Peary and Amundsen, which though more successful, were nevertheless filled with hardship, are monuments to the indomitable will in the heart of man to surmount the obstacles that stand between him and the mastery of his world.

Physics has banished most of the terrors of arctic exploration. It has conquered the twin horrors of darkness and isolation by its development of the electric light and of the radio.

The latest evidence of these splendid contributions to the progress of science is best presented in the little message "Alive and Well." These three words recently flashed forth from Little America to inform the world that Lincoln Ellsworth, American explorer, and Herbert Hollick-Kenyon, Canadian Royal Air Force flyer, are safe and sound after their daring Antarctic flight.

Physics gives the explorer, in the Arctic or in the interior of vast continents, conquest over space. With the camera in his airplane, he can explore and accurately record the geography of wide horizons which could not be mapped by months of travel on the earth.

Physics has gathered the corners of the earth ever closer and closer together by means of great ships that float, long trains that run on shining tracks, arched bridges that balance from shore to shore, wires that carry voices, and radios that make the world a whispering gallery.



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